Response to Third Office Action

This is a response to your office action which rejected claims from our patent application, "Image Transfer and Archival System", filed on July 23, 2001. I will address your points one by one, but I believe all the rejected claims should be accepted. The Tanaka patent (U.S. Patent 6,564,256) you rely on heavily, covers different subject matter. For example, you have rejected all 18 claims in the application. In past responses I have taken a macroscopic approach to contrast our application with the Tanaka patent. In this response I will detail the differences between Tanaka and our patent application. Tanaka does not describe the elements in our application.

General Comments

Most of your rejections are based upon the prior art of Tanaka (U.S. patent No. 6,564,256). Tanaka describes a client/server arrangement of terminals (i.e. web browsers) and servers to handle discrete events to transmit DICOM image data from a database to the terminals. Tanaka uses multiple servers to overcome the problem of long response times, and fault tolerance, when the terminal makes a request. The relay servers described by Tanaka perform some image compression and format conversion in order to meet the requirements of the terminals (i.e. web browsers). Tanaka describes that the image conversions are solely for the purpose of delivering an image of a compatible type for the terminal, and to make sure the image does not exceed some specified maximum size.

Our invention deals with the problem of transmitting volatile images from an image producing device to a server device. Without some kind of queue and image reduction mechanism, these images will be permanently discarded if there is any delay in transmitting the images from the client device to server

device. The image producing portion of the client machine uses the limited resources of the client in order to continue generating or analyzing additional images. For this reason, images are placed in a queue for eventual transfer to the server device. Due to issues such as network congestion or the rapid generation of images, the queue can overflow. Under these conditions, our invention describes a series of steps to prevent images from being permanently discarded and lost. Tanaka describes completely different subject matter. In fact, Tanaka never discusses using a queue for image storage. Rather he discusses a cache used to redeliver the image for efficiency. A detailed reading of Tanaka against our invention will show that the similarity between the two is limited to transmitting digital images on a network. The image manipulation performed by Tanaka is fundamentally different and for different purposes than described by our invention. Tanaka uses the features of a web server to deliver images in a suitable format for display.

I will now address your issues on a claim by claim basis.

Claim 1, the steps,

- optionally making a copy of the image to free up system resources on the client;
- placing a copy of the image in a client queue if the image cannot be transmitted immediately;

You claim these are covered by Tanaka (col 5, lines 47-55), saying "Tanaka discloses a relay server accumulating pieces of the image data before it goes to the archiver."

Tanaka is describing a data cache to accumulate data prior to transferring the image data to the terminal. Tanaka better describes the use of the cache in col 4, lines 13-19. Tanaka does not describe making a copy of the image on the relay server, archiver, or database. In our invention, the creation of a copy is important, because the client device can free up system resources on the client for other purposes. For example, if the client device is a machine vision system, the image buffer now becomes available to

hold another image to be inspected. The image copied to the image queue will be potentially altered prior to transmission to the server. Tanaka does not describe this situation because a request can take as much time, and as many resources, as necessary until it completes. Our invention describes how to maximize the ability to transmit volatile images between a client and server without destroying them. With Tanaka, there is no need for a queue because when the image is available it can be transmitted immediately.

Claim 1, the steps,

- measuring the client resource availability of local resources and available processor time and maintaining historical information and trends;
- measuring the status and performance of the network connecting the client device and server device, and maintaining historical information and trends;

You claim these are covered by Tanaka (col. 6, lines 49-56, col. 10, lines 4-15). In our specification we define resource availability as, "Resource availability 315 is a combination of current resource information as well as historical information and trends. The client transfer mechanism 320 uses this information to decide the amount of resources available to manipulate the image prior to transmission. Resource availability 315 also includes information regarding the availability of image analysis specific resources such as frame buffers and image buffers." The Tanaka references you cite refer to using multiple servers to handle requests from the terminals, and solves a completely different problem. Tanaka does not discuss nor provides any motivation for measuring the resource availability on the client and maintaining historical trends. Tanaka does not discuss nor provides any motivation for measuring network performance and maintaining historical trends. Tanaka does not describe the motivation why this would ever be useful. It might be helpful to note that Tanaka uses multiple servers to distribute the load of handling requests. A good reference that describes this hardware configuration can be found in wikipedia at http://en.wikipedia.org/wiki/Load_balancing_%28computing%29. In our invention, a single client device has only its internal resources at its disposal to attempt to transfer all

image data to a server device. In our invention, load balancing and redundancy does not exist. It is nonobvious to a person having ordinary skill in the art to extend the invention described by Tanaka to produce what this claim describes.

Claim 1, the step,

- increasing the size of the client queue if it becomes full;

You admit this is not covered by Tanaka, but assert that it is disclosed by Dobbelstein (5,881,269). Contrary to your assertion, a person of ordinary skill would be unable to connect both patents. Tanaka never mentions the possibility of failure of processing a request and provides no motivation to attempt to recover from such a state. The only reference by Tanaka states, "Further even if one of the relay servers fails, the other relay servers can act for the fault relay server" (col 4., lines 10-12). In this context, Tanaka is referring to what a load balancer does; using multiple servers to handle a request if one of the servers fails (i.e. stops running). Tanaka does not discuss anything to prevent a request on an individual server from failing because of queue size. Presumably, a system patterned after Tanaka will crash under these conditions, causing the loss of any information on the server. Thus, Tanaka neither teaches nor suggests either the problem or the resolution to the problem as claimed in Claim 1. Dobbelstein is not directed to solving any problem related to image manipulation or image transfer. As a result, a person of ordinary skill in the art of image manipulation or image transfer would not look to Dobbelstein for any purpose related to image manipulation. Dobbelstein does disclose increasing the size of a queue to prevent a network emulator from failing. However, the context of Dobbelstein's invention is simulating multiple users on a network with a single workstation, not image manipulation. Given that Tanaka does not address the problem or solution regarding queue size, and Dobbelstein is discussing a completely different subject area, it is not obvious to modify Tanaka in view of Dobbelstein. And even if someone were to combine these two inventions, it does not cover our invention. They describe different,

incompatible, things. If you were to combine the two patents you would have an image transfer system in the context of the simulation of a local area network. This does not describe our invention.

Claim 1, the step,

- reducing the size of images to conserve storage space in the queue or to reduce transmission time between the client and server;

You claim this is covered by Tanaka (col. 10, lines 53-65). Tanaka describes two things. The first is to convert an image into a format compatible with a web browser. The second is to compress the image if the data size is too large prior to transmission. Tanaka describes the motivation for reduction is when the image data is too large. Tanaka does not describe, or even infer, that size reduction will conserve storage space as an image waits to be transmitted. Tanaka never describes the use of a queue (by name or description) as a means to buffer images waiting to be sent from a client device to a server device. It is nonobvious to a person having ordinary skill in the art to extend the invention described by Tanaka to produce what our invention describes. The cache described by Tanaka is to increase efficiency when the same image is requested for transmission. It does not provide the same type of functionality as the queue described in our invention (see Tanaka col 4, lines 13-19), nor does Tanaka provide any limitation or motivation to extend his invention to do any dynamic image reduction.

With Tanaka, the conversion of the image uses a predetermined format. The conversion is fixed or negotiated between the server and the terminal (i.e. web browser). In our invention, a set of rules is imposed to preserve both the image resolution and content. However, the image will be permanently and destructively altered, if necessary, to insure that the server device can receive the image given the current network performance and conditions of the client device queue. Tanaka takes an archived image and converts it for display. The original image is not altered in any way. Our invention deals with

volatile images that will be deleted unless a means is found to persist them until such time they can be transmitted to a server device. Tanaka does not use image reduction to conserve storage space in a queue; Tanaka uses compression to satisfy a requirement of the web browser. Tanaka makes no mention that size reduction will reduce transmission time; Tanaka states that compression is only performed when "the medical image data is too large in data size."

Claim 2

A system according to claim **1**, wherein the step of increasing the size of the client queue includes an upper limit to prevent the queue from growing beyond a specified size.

Claim 15

A system according to claim 14, wherein the step of increasing the size of the client queue includes an upper limit to prevent the queue from growing beyond a specified size.

You claim this is covered by Tanaka (col 10, lines 18-52) because he discloses using only a certain amount of protocol conversion servers. Tanaka is not describing what we describe in claim 2 and 15. Tanaka does not use the protocol conversion servers as a queue. He uses them for fault tolerance and efficiency. The notion of increasing the size of a queue up to a certain size has no parallel in Tanaka's invention because the hardware configuration is static. It is nonobvious to a person having ordinary skill in the art to extend the invention described by Tanaka to produce what our invention describes.

On page 3 of your most recent response you state that Tanaka does not teach either claim 2 or claim15; "Tanaka fails to teach the limitation further including increasing the size of the client queue if it becomes full." If Tanaka does not discuss increasing the size of the client queue, he certainly cannot discuss setting an upper bound on the queue size.

Claim 3

A system according to claim 1, wherein the step of transferring the signal from the client to the server can include encrypting the information on the client prior to transmission and decrypting the data once it is received by the server

You argue that claim 3 is unpatentable over Tanaka in view of Dobbelstein and Glass because Tanaka teaches the method of claim 1. Tanaka describes a system to transfer medical images between a server and a terminal. Dobbelstein describes simulating multiple users on a network with a single workstation. Glass describes encrypting biometric information over a network.

Contrary to your assertion, a person of ordinary skill would be unable to connect these three patents. Tanaka never mentions the possibility of failure of processing a request and provides no motivation to attempt to recover from such a state. Thus, Tanaka neither teaches nor suggests either the problem or the resolution to the problem as claimed in Claim 1. Dobbelstein is not directed to solving any problem related to image manipulation or image transfer. As a result, a person of ordinary skill in the art of image manipulation or image transfer would not look to Dobbelstein for any purpose related to image manipulation. Dobbelstein does disclose increasing the size of a queue to prevent a network emulator from failing. However, the context of Dobbelstein's invention is simulating multiple users on a network with a single workstation, not image manipulation. Glass deals with encrypting biometric information over a network. However, neither Tanaka nor Dobbelstein discuss with the issue of encryption and provides no motivation for its use. Given that Tanaka does not address the problem or solution regarding queue size, and Dobbelstein and Glass are discussing a completely different subject area, it is not obvious to modify Tanaka in view of Dobbelstein and Glass.

Claim 4

A system according to claim 1, wherein the step of transferring the image signal from the client to the server can comprise:

- transmitting image data from one or more clients to a gateway server, such that the clients consider the gateway server to be a server;
- buffering the image data on the gateway server;
- transmitting image data from the gateway server to the server, such that the server considers the gateway server to be a client.

You claim that Tanaka describes this in col. 5, lines 33-55, col. 6, lines 49-58, and col. 10, lines 4-52. These sections describe how protocol conversion servers and relay servers are used to improve efficiency. The protocol conversion servers described by Tanaka bear no resemblance to the gateway server described in our invention. The relay servers described by Tanaka does bear some resemblance to our gateway server because it adds a server layer between the client and the server. There is one very important difference. The relay servers described by Tanaka cannot be used without modifying the protocol used for transferring command and images because operations are shifted from the terminal to the relay server. In this claim, the gateway server looks like a client device to the server, and as a server device to the client. As a result, a gateway server can be added to the system without any other alterations.

Claim 5

A system according to claim 1, wherein the step of reducing the size of an image comprises:

- selecting one or more reduction methods to reduce the image size from a plurality of lossless or lossy compression methods;
- reducing the current image, or any image in the queue when the queue becomes full;
- periodically reducing the size of the images in the queue, using reduction methods when processor resources are available.

Claim 6

A system according to claim 5, wherein the step of selecting one of more reduction methods comprises:

- estimating the reduction in image size possible for a specific reduction method;
- estimating the cost of this reduction where the cost includes the resources required for reduction as well as the time to reduce the image;
- performing the reduction if the cost is allowable and the reduction is considered meaningful;
- evaluating other reduction methods if the desired amount of reduction has not been achieved.

Claim 16

A system according to claim 14, wherein the step of preventing images from being discarded by reducing the size of said images comprises:

- selecting one or more reduction methods to reduce the image size from a plurality of lossless or lossy compression methods;
- reducing the current image, or any image in the queue when the queue becomes full;
- periodically reducing the size of the images in the queue, using reduction methods when processor resources are available.

Claim 17

A system according to claim 16, wherein the step of selecting one of more reduction methods comprises:

- estimating the reduction in image size possible for a specific reduction method;

- estimating the cost of this reduction where the cost includes the resources required for reduction as well as the time to reduce the image;
- performing the reduction if the cost is allowable and the reduction is considered meaningful;
- evaluating other reduction methods if the desired amount of reduction has not been achieved.

Your argument against claims 5, 6, 16, and 17 uses the same Tanaka reference from the 7th step of claim 1 (col 10, lines 53-65). Claim 5 and 6 (and 16 and 17) describe specific actions taken to reduce image size, including "periodically reducing the size of the images in the queue, using reduction methods when processor resources are available," and "performing the reduction if the cost is allowable and the reduction is considered meaningful." Tanaka only describes compression for displaying images in a predetermined format. Tanaka does not discuss nor provides any motivation for selecting a reduction method using lossless, or lossy compression methods. Tanaka does not discuss nor provides any motivation for reducing the any image in the queue when the queue becomes full. Tanaka never mentions a queue nor the possibility of becoming full. On page 3 of your most recent response you state, "Tanaka fails to teach the limitation further including increasing the size of the client queue if it becomes full." Tanaka does not discuss nor provides any motivation for periodically reducing the size of images in the queue when processor resources are available. Tanaka does not discuss nor provides any motivation for estimating the reduction of image size possible using a possible reduction method. Tanaka also does not take into account the resource requirements of a particular reduction method. Tanaka does not discuss nor provides any motivation for choosing a reduction method based upon the cost and resulting savings from any reduction. Tanaka does not discuss nor provides any motivation for additional reduction methods to preserve a meaningful representation of all images in the queue.

The notion that someone skilled in the art can take the statements from Tanaka ("when the medical image data is too large in data size, compress the data size of the medical image data before transferring the medical image data to the terminals T1 to Tn.") and extrapolate it to cover claims 5, 6, 16, and 17 is

preposterous. Tanaka does not mention any of these reduction details, or any motivation to apply our reduction regime. Tanaka makes a casual reference to taking an image and performing format conversion and size reduction in order to meet the requirements of the terminal. Upon reading Tanaka, a skilled person will not propose the reduction regime proposed by our invention. In fact, it would never be an issue because Tanaka describes a system whereby the user can request the same image at a future date, and the image would be acquired from the database and returned to the terminal. There is no reason to propose or implement our reduction regime because his images are not transient.

Claim 7

A system according to claim **6**, wherein the step of determining if the cost is allowable comprises:

- checking the current system resources to see if sufficient resources and time are available to reduce the image;
- checking historical system resources and trends to estimate future resource availability;
- checking the current network parameters such as available bandwidth and throughput;
- checking historical network conditions and trends to estimate future network conditions.

Claim 18

A system according to claim 17, wherein the step of determining if the cost is allowable comprises:

- checking the current system resources to see if sufficient resources and time are available to reduce the image;
- checking historical system resources and trends to estimate future resource availability;
- checking the current network parameters such as available bandwidth and throughput;
- checking historical network conditions and trends to estimate future network conditions.

You reference Tanaka (col 6., lines 49-56, col. 10, lines 4-15) as prior art. In both of these references, Tanaka states that "the relay server can distribute the requests to other relay servers" and "the protocol conversion servers can distribute the requests to other protocol conversion servers." In other words, Tanaka is describing load balancing to improve efficiency. Tanaka provides no other details. Tanaka does not discuss nor provides any motivation for verifying if sufficient system resources and time exist to reduce an image. Tanaka does not discuss nor provides any motivation for using historical trends to estimate future resource availability. Tanaka does not discuss nor provides any motivation for checking

current network bandwidth and throughput. Tanaka does not discuss nor provides any motivation for estimating future network conditions using historical trends.

Claim 8

A system according to claim 1, wherein the step of transferring the image signal from the client device to the server device comprises:

- storing the received image in a server queue or on a networked file system;
- increasing the size of the server queue if it becomes full;
- reducing the size of images to conserve storage space in the queue or to reduce storage requirements in the image database.

This claim describes how the server device is designed in a similar manner as the client device. Tanaka has no provision for a queue on both ends of the system (i.e. at the client device and the server device). Tanaka makes no mention of a queue to store a pending list of images waiting for storage. Tanaka uses a cache to improve efficiency but Tanaka does not discuss nor provides any motivation for using a cache as a queue to store transient images. You reference Tanaka (col. 10, lines 18-39) as describing increasing the size of the server queue if it becomes full. However, on page 3 of your most recent response you state, "Tanaka fails to teach the limitation further including increasing the size of the client queue if it becomes full." Claim 8 also specifies "reducing the size of images to conserve storage space in the queue or to reduce storage requirements in the image database." You reference Tanaka (col. 10, lines 53-65) as prior art. However, Tanaka describes image reduction if the image exceeds a specified size and for compatibility for display in a web browser. In our invention, the image size can be reduced in order to consume less space in the server database or the queue and to prevent the loss of transient image data. Tanaka does not discuss nor provides any motivation for reducing storage space in a queue or image database. It is nonobvious to a person having ordinary skill in the art to take this Tanaka reference and create our invention by introducing an entirely new paradigm, system design, and purpose.

Claim 9
A system according to claim **8**, wherein the step of increasing the size of the server queue includes an upper limit to prevent the queue from growing beyond a specified size.

You claim this is covered by Tanaka (col 10, lines 18-52) because he discloses using only a certain amount of protocol conversion servers. Tanaka is not describing what we describe in claim 9. Tanaka does not use the protocol conversion servers as a queue. He uses them for fault tolerance and efficiency. The notion of increasing the size of a queue up to a certain size has no parallel in Tanaka's invention because the hardware configuration is static. It is nonobvious to a person having ordinary skill in the art to extend the invention described by Tanaka to produce what our invention describes.

On page 3 of your most recent response you state that Tanaka does not teach claim 9; "Tanaka fails to teach the limitation further including increasing the size of the client queue if it becomes full." If Tanaka does not discuss increasing the size of the client queue, he certainly cannot discuss setting an upper bound on the queue size.

Claim 10
A system according to claim **8**, wherein the step of reducing the size of an image comprises:

- selecting one or more reduction methods to reduce the image size from a plurality of lossless or lossy compression methods;
- reducing the current image, or any image in the queue when the queue nears or becomes full;
- periodically reducing the size of the images in the queue, using lossless compression methods when processor resources are available.

Your response introduces a new patent by Lopresti (6,298,173) as prior art because Tanaka and Dobbelstein fail to teach the selection of one of more reduction methods to use. Lopresti describes a storage management system that follows preference rules to maintain high quality images while attempting to reduce storage requirements. The Lopresti system can presumably take as much time as necessary to analyze and reduce images given a set of preferences based on the size and age of a document. For example, the Lopresti system, once configured, will analyze and reduce a particular

image identically each time the image is analyzed. In our invention the reduction is dynamic in nature, and only applied when necessary to prevent images from being deleted. The goal of our invention is to preserve all images produced by the client device. However, because of network bandwidth, and the speed at which new images are added to the queue, our reduction regime must be imposed to preserve the exact representation of the image, or at least an image with as little destruction as possible. Lopresti has a completely different goal and method. Lopresti has no notion of these temporal requirements, nor does it discuss the compression in the context of our invention. You state that the motivation to use Lopresti is "because it allows for good data compression performance." Because Lopresti does not deal with transient images, this means that Lopresti does a good job at saving storage space. However, in our invention, the saving of space is a by-product of the need to transfer image signals from a client device to a server device.

You argue that claim 10 is unpatentable over Tanaka in view of Dobbelstein and Lopresti because Tanaka teaches the method of claim 8. Tanaka describes a system to transfer medical images between a server and a terminal. Dobbelstein describes simulating multiple users on a network with a single workstation. Lopresti describes reducing storage space of text and images in a storage management system. Contrary to your assertion, a person of ordinary skill would be unable to connect these three patents. Tanaka never mentions the issue of an upper limit of queue size, much less of using a queue to hold transient images. Thus, Tanaka neither teaches nor suggests either the problem or the resolution to the problem as claimed in Claim 8. Dobbelstein is not directed to solving any problem related to image manipulation or image transfer. As a result, a person of ordinary skill in the art of image manipulation or image transfer would not look to Dobbelstein for any purpose related to image manipulation. Dobbelstein does disclose increasing the size of a queue to prevent a network emulator from failing.

However, the context of Dobbelstein's invention is simulating multiple users on a network with a single workstation, not image manipulation. Lopresti discloses how the size of an image database can be reduced by using lossless and lossy reduction methods. Lopresti is not directed to solving any problem related to image transfer or dynamically reducing transient images. However, neither Tanaka nor Dobbelstein discuss the issue of saving space in an image database and provides no motivation for its use. Given that Tanaka does not address the problem or solution regarding queue size, and Dobbelstein and Lopresti are discussing a completely different subject area, it is not obvious to modify Tanaka in view of Dobbelstein and Lopresti.

Claim 11

A system according to claim **10**, wherein the step of selecting one of more reduction methods comprises:

- estimating the reduction in image size possible for a specific reduction method;
- estimating the cost of this reduction where the cost includes the resources required for reduction as well as the time to reduce the image;
- performing the reduction if the cost is allowable and the reduction is considered meaningful;
- evaluating other reduction methods if the desired amount of reduction has not been achieved.

Your response states that claim 11 is covered by Tanaka (col. 10, lines 63-65) as well as Dobbelstein (no reference cited). However, there is nothing in Tanaka or Dobbelstein that describes this reduction regime. Neither Tanaka nor Dobbelstein discusses or provides any motivation for estimating the reduction in image size for a specific reduction method. Neither Tanaka nor Dobbelstein discusses or provides any motivation for estimating the time and resource expense for reducing an image. Neither Tanaka nor Dobbelstein discusses or provides any motivation for reducing an image if the reduction is considered meaningful. Neither Tanaka nor Dobbelstein discusses or provides any motivation for evaluating other reduction methods as needed.

Claim 12

A system for transmitting digital image signals from a client device to a server device, comprising:

- establishing a connection between one or more client devices and server device;
- optionally making a copy of the image to free up system resources on the client;
- dividing the available network bandwidth between the client and server into one or more pieces and assigning certain images to be transmitted using these reserved channels;
- placing a copy of the image in a client queue if the image cannot be transmitted immediately;
- measuring the client resource availability of local processor resources and available processor time, and maintaining historical information and trends;
- measuring the status and performance of the network connecting the client device and server device, and maintaining historical information and trends;
- increasing the size of the client queue if it becomes full; reducing the size of images to conserve storage space in the queue or reduce transmission time between the client and server;
- transferring the image from the client device to the server device;
- persisting the image on the server device until it is processed or saved.

Claim 12 can be analyzed like Claim 1. To summarize those arguments, Tanaka does not discuss or provides any motivation for storing transient images in a queue, measuring resource availability, and transforming images as necessary to conserve space in a queue. There is one additional step, "dividing the available network bandwidth between the client and server into one or more pieces and assigning certain images to be transmitted using these reserved channels." You cite Tanaka (col. 5, lines 47-55) as "disclosing using different relay servers and piecing the image". However, this section of Tanaka describes using a cache to accumulate pieces of medical image data to be transmitted to a terminal. Tanaka does not discuss nor provides any motivation for reserving bandwidth between client and server and assigning certain images to use this reserved bandwidth.

Claim 13

A system according to claim 12, wherein the step of reserving network bandwidth comprising:

- specifying the mapping of image type to a reserved piece of network bandwidth;
- using any remaining, unreserved network bandwidth for images that do not have any defined mapping;
- allocating a separate queue for each piece of network bandwidth or allocating elements from a single queue;
- identifying the type of image and routing this image to the appropriate piece of network bandwidth or queue;

You cite Tanaka (col. 9, lines 1-37) as disclosing using different servers for different types of image data. However, claim 13 describes the assignment of network bandwidth based on image type and

importance. The assignment of bandwidth is very different than the assignment of server. Tanaka does not discuss or provides any motivation for specifying a mapping of image type to a reserved piece of network bandwidth. Tanaka does not discuss or provides any motivation for using unreserved network bandwidth for images that have no defined mapping. Tanaka does not discuss or provides any motivation for allocating a separate queue for each piece of network bandwidth. Tanaka does not discuss or provides any motivation for identifying the type of image and routing the image to the appropriate network bandwidth or queue.

The Applicants respectfully ask the Examiner to enter the amendments, reconsider and withdraw the rejections, and pass the application, as amended, to issue.

Respectfully submitted,

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